Meaning between, in, and around words, gestures and postures: multimodal meaning making in children's classroom communication

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Abstract

*The view of language from a social semiotic perspective is clear. Language is one of many semiotic resources we employ in our communicative practices. That is to say that while language is at times dominant, it always operates within a multimodal frame and furthermore, at times modes other than language are dominant. The proposed 2014 National Curriculum for the UK, on the other hand, values pupils' face-to-face classroom interaction in terms of standard spoken English (i.e. in terms of the mode of language alone). This paper offers examples demonstrating how embodied modes such as gesture, posture, facial expression, gaze and haptics work in conjunction with speech in children's collaborative construction of knowledge. In other words, what may have been previously conceived as gaps and silences - often interpreted as an absence of language - are in fact instantiations of the work of semiotic modes other than language. In order to consider this closely, this paper offers evidence from a multimodal micro-analysis of pupil-to-pupil, face-to-face interaction in one science lesson in a Year Five UK Primary classroom. It demonstrates **how** children's meaning-making is achieved through apt use of all available semiotic resources.*

Keywords multimodal discourse analysis, postural intertextuality, cohesion, meaning-making

word count 7,029

Introduction.

Educational research into children's classroom communicative practices has traditionally centred on linguistic modes (Maybin, 1996, Alexander, 2000 Mercer, 1995, 2000). From the beginning of the century, following publication of Kress and Van Leeuwen's 'Multimodal Discourse' (2001), there have been studies of teacher–pupil classroom communication incorporating other modes of meaning-making such as gaze and posture in addition to language (Jewitt and Kress, 2003, Flewitt 2005, 2006). The focus on multimodal meaning-making in educational research has emerged partly through a need to engage with increasingly sophisticated means of meaning-making in the 21st century but also through the opportunity to include multiple modes in analyses of interactions. It is possible to examine more closely communication between 21st century adults and children due to advances in digital technology and cameras in particular. Studies of classroom communication which employ a multimodal perspective include: studies of science lessons (Wells, 2000, Kress 2003); research into multi-literacies and pedagogic implications of multimodal text creation in the classroom (Cope and Kalantzis, 2000; Zammit, 2007; Jones, 2007; Pahl, 2007; Lancaster, 2007, James et al, 2004); studies using new ways of conceptualising communication and grammar to investigate, analyse and describe what is taking place in our classrooms (Kress, et al 2005; Jewitt, 2006; Bourne and Jewitt, 2003; Van Leeuwen, 1998); and studies using multimodal analysis of children's interaction to reveal more of

what is taking place (Flewitt, 2005, 2006; Taylor, 2006).The study presented here has focussed on pupil-to-pupil classroom communication.

This article makes two main points about language and education. Firstly, it presents evidence of meaning in face-to-face interaction being communicated through the use of multiple modes and shows how learning similarly takes place through pupils' use of all available semiotic resources. This is an important area for research because assumptions are made about the importance of language in teaching and learning where in fact there is a growing understanding that these are accomplished multimodally. (Kress et al 2006. Roth, 2009.) In this article I draw on data from a study of children's spontaneous interaction in class to demonstrate how children share knowledge and build relationships in class-based activities multimodally.

Secondly, I argue that that education professionals and policy makers need to be aware of this so that opportunities for children's meaning-making in classroom can be devised and facilitated in ways which embrace the multimodal nature of their communicative practices. I present evidence that raises a direct challenge to the language dominant forms of classroom activity and pupils' text production currently promoted through UK education policy and in the proposed 2014 National Curriculum.(www.gov.uk/government/consutations, 2013)

I begin by providing an overview of sociolinguistic and multimodal perspectives on meaning-making in order to contextualise my theoretical position. Following this, I briefly describe my methodology. This is followed by an outline of the context and aims of this school-based research. I outline my approach to transcription which highlights that which would have been missed through a focus on language alone. The framework for analysis which I have devised, based on close attention to cohesive devices in children's communication, illuminates ways in which meaning-making is multimodal. Through a specific focus on repetition and intertextual referencing I explore how knowledge and interpersonal relationships are realised through gesture and posture as well as language. Furthermore, I demonstrate that what might have been viewed as 'gaps and silences' when seen from a linguistic point of view are, in fact, instantiations of meaning conveyed through modes such as gesture and posture. I use examples from a science lesson to illustrate my arguments regarding children's use of all available semiotic resources in learning and follow this with discussion of implications for education professionals.

The theoretical context

Socio-linguistic perspectives are founded on the notion of language in use as constantly evolving and subject to context of situation and context of culture (Halliday, 1985). Language choices are made

based on an historical legacy of utterances and the modifications made through time develop the language used in social situations into what Bakhtin termed 'speech genres' (Bakhtin: 1999:123) From this perspective, language is also seen as a semiotic tool which fulfils the personal needs and goals of the user. Modes such as gesture, gaze or posture are viewed as additional contextual information. Moreover, silence or the absence of language, from a linguistic perspective, has been considered as either having a boundary-making function marking the beginning and end of utterances, or an absence of meaning (Saville Troike, 1985:3). From the 1950's (Hall, 1959) some socio-linguists have concerned themselves with the meaning potential of silence. This article argues that meaning-making is a multimodal activity, which does not leave room for the notion of an absence of meaning. Meaning is, therefore, always being made, but not necessarily through language.

A multimodal perspective challenges the language dominant view of communication and urges the analyst to consider the work of all modes. Halliday's (1985) initial consideration of language as a semiotic tool for meaning-making inspired theorists to turn their attention to other semiotic resources (Hodge and Kress, 1988, Kress and Van Leeuwen 2001, Kress, 2010). Van Leeuwen conceptualises these resources as 'actions and artefacts we use to communicate' (2005:3). They can be physiological, that is voice, gesture, bodily actions, or technical, that is materials and tools such as textiles and scissors, pen and paper, computer hardware and software. The multimodal nature of the data in this study requires analysis of language used but does not presuppose a dominance of language or foreground the mode of speech. Norris (2004: 2) takes the view that whilst language does not always play a central role in communication, it cannot be denied that it often does, and that whilst there are occasions when gesture and gaze, for example, may be subordinated, there are other occasions when they may also take a superior position in an interaction and yet others where language may be absent altogether. Multimodal analysis of communication endeavours to take account of the linguistic, visual, aural, spatial and haptic.

The following section outlines the methodology behind this project and then I introduce the research aims and explain the original procedural approach of the study before presenting some examples of meaning in and around words, gestures and postures from a science lesson.

The methodological approach

Broadly the approach was based on Linguistic Ethnography as proposed by Maybin (2007). Linguistic ethnography has an interest in contextualised observation of language and communication in natural settings to understand people better. The original framework for the analysis has been developed from an initial study (Taylor, 2006) and is based on analysis of discourse exemplified by Tannen, (1989), Gee (1999), Hyatt,(2005) and Cameron (2001) and a multimodal analysis primarily informed by O'Halloran, (2004) Jewitt ,(2003), and Norris (2001). The approach to analysis in this study hinges upon two original research tools, namely, the grid devised for the transcription of multimodal

discourse and secondly the framework for the analysis of metafunctions in discourse. These are outlined in the section below.

The context of the research

The broad aims of this study were both methodological and pedagogical. I wanted to devise a way of capturing the 'flow' of conversation between children without privileging speech and a way of analysing the discourse attending to multiple modes. The research questions are focussed on classroom communication and creativity. The creativity of children's face-to-face interaction was considered within the conceptualisation of creativity as 'not simply a property of exceptional people but an exceptional property of all people' (Carter 2004:13). Tannen's (1989) notions of fixity and novelty in language, have been considered in relation to all modes. Specific examples relating to creativity in children's classroom communication have bee published elsewhere (Taylor, 2012) but creativity is also an aspect to the examples presented here. The research questions were:

1. What do modes other than language contribute to the communicative process?

2. Is there evidence that children can construct and present knowledge and understanding through multiple modes?

3. What kind of additional information can multimodal analysis offer our understanding of creativity *in children's communicative practices?*

The context for this study was a mixed inner city Primary school in a post industrial city in the north of England. This research was based upon naturally occurring data from an everyday setting, a classroom, which is an example of everyday classroom practices. This research was conducted in a Year Five (ages 9-10) classroom. Over a period of four months the children were observed and video filmed in conversation with one another as they worked in classrooms. I worked with the class filming child-to-child spontaneous interactions wherever and whenever possible. Full permission to observe and video record in class and to use material for publication was sought from and given by both parents and carers and the children themselves. As part of the project I felt it was important the children should have some direct benefit and so I taught the children how to use Windows Movie Maker and make their own documentary films using film footage from the project. My position in this research setting was an 'insider' to the setting through roles such as parent, helper and school governor, whilst being an 'outsider' to the children's interactions. The organisation of the school day, the staffing structure and physical environment of the setting were therefore all familiar to me.

Over a four month period I spent 26 days in the year five class. The research was conducted during the summer term making it possible to observe activities such as PE on the school field and in the yard and a site visit as part of the geography lesson. In total fourteen Literacy lessons, fifteen maths, five PE, four Religious Education, three Art, five ICT, three geography, one history, two French, three

music and two science lessons were observed. The comparatively large numbers of Literacy and Numeracy lessons reflects the organisation of the school day in line with the National Curriculum requirements in 2008 whereby the children studied Literacy and Numeracy as discrete subjects five days a week. Two visits to the school library and the election of class representatives to the School Council were also observed. A journal of observation notes and sketches written contemporaneously as well as immediately following the observed lessons was kept.

The video data consists of instances of discrete episodes of communication. From nine hours of video data two science lessons, two literacy lessons, and a geography lesson were selected for fine-grained analysis based upon the range of subjects and the collaborative nature of classroom meaning-making taking place. I chose these five episodes because of the many examples of gesture and posture and I wanted to investigate the part played in meaning-making of modes other than language. In two of these lessons, including the science lesson presented here, the teacher invited the pupils to role-play geographical or scientific phenomena giving the children greater freedom of multimodal expression. The multimodal data is rich and one 20 minute conversation can provide very detailed data for analysis. The textual analysis of extended instances of communication was not feasible given the timescale and potential volume of the data and so the focus for close textual analysis was upon three 3-minute extracts from each of the five lessons of 20 to 40 minutes. The work of cohesive devices in these extracts were then analysed with reference to the interpersonal and ideational information from the wider data set of video footage of the whole lesson and observation notes.

Research procedures

First of all, I introduce the grid used for the multimodal transcription (Table 1).The transcript was shaped by decisions about what to include as much as how features are included. Whilst anxious not to miss anything, I knew that I could not attempt to include every nuance, pause, slight movement or pitch change. Some researchers using discourse analysis include gestures and facial expressions where they are considered to be important (Kyratzis, 2004: 637) or gestures and gaze (Sidnell, 2006). My own theoretical position required that I did not view modes other than speech as simply contextual information but leaned more towards Kress's view that our communicative practices are constituted of multiple modes and that semiotic resources are equally powerful, whilst acknowledging the dominance and prominence at times of speech and writing (Kress, 2003: 290, and 2008). As Norris remarks:

> By de-emphasizing spoken language, we are not taking away the importance of spoken language, but are rather accentuating the other communicative modes that are as essential in interaction as spoken language.
>
> Norris, 2004:65

This approach to multimodal transcription, therefore, tries to capture the flow of conversation apparent in a speech transcript within the transcription of other modes, so that mirrored bodily actions, repetitive gestures, exchanges of glances can be read simultaneously on the transcript.

Table 1 : Multimodal Transcript Grid

Number of Turn	Vocalisation/ speech	Action	Gaze	Gesture, Facial expression	Posture, Proxemics / Haptics
1					
2					

The first column in the grid is for the counter number on the digital video film at the beginning of the extract and the number of each turn. A turn is a communicative act as part of the series of acts that make up an interaction. It is often marked by an utterance (Column 2, speech or vocalisation – such as humming) but it may also comprise an action, a gesture, or gaze and it may also consist of 2 participants speaking or performing an action or gesture at the same time. It is important to note that in any one turn a number of different communicative acts may be happening concurrently and independently. This analysis is concerned with moments in interaction where one mode may be dominant and fore-grounded and carry the weight of the main interest in the conversation and other modes may be simultaneously in full flow but backgrounded. In this case, the speech, action or gesture of both participants is in the same box. Gaze is noted in the fourth column, and Gesture and Facial Expression are included together in column 5 as they so often correspond. Posture, Proxemics (how close the participants are to each other) and Haptics (touch) are put together as they so often coincide (for example stretching out a hand to touch someone whilst at the same time leaning towards them would be difficult to separate as it is part of one act of meaning-making, and yet it comprises each of these aspects). Action, in column 3, includes actions which are carried out during a conversation but not necessarily overtly part of meaning-making such as walking across a room or opening a door – although these actions may be seen to be significant when considered with the transcript as a whole. The children are identified by an initial as I made a decision not to use pseudonyms because they are rarely interpreted neutrally. I acknowledge that a possible drawback of this may be a depersonalisation of the participants but felt more comfortable with this prospect than with ascribing of possible identities to the children.

Now I turn to the framework for analysis. In drawing upon a systemic functional approach to language, this is comparable with O'Halloran's (2004) approach to multimodal discourse analysis (although it should be noted O'Halloran does not specifically employ this in analysis of face-to-face interaction and the use of embodied modes) and Hyatt's approach to critical discourse analysis (Hyatt

2005) . The framework used considers interpersonal and ideational functions followed by micro-analysis of textual metafunction. The textual metafunction is considered by focussing on cohesion, and the multimodal use of cohesive devices such as repetition, reference, omission, substitution, and intertextual reference, and coherence. The multimodal use of a tool (SFL) initially used to examine language use enabled this researcher to see or hear now that which could not have been seen beforehand. (Machin, 2013:3). The issues with imposing linguistic concepts have been more fully discussed elsewhere (Machin 2013) but this framework enabled me to probe the multimodal aspects of cohesion in discourse and examine the mesh of modes at work in a systematic way.

Table 2 Framework for analysis

Metafunction	**Analysis**
Interpersonal-WHO	Interpersonal functions such as Instrumental, Regulatory, Interactional, Personal, Heuristic, Imaginative and Representational (Halliday, 1975)
Ideational- WHAT	The subject matter of the discourse eg blood crirculation.
Textual - HOW	Cohesive devices such as repetition, reference, metaphor, substitution and omission, intertextual reference. Coherence - generic discoursal features.

The close attention to the textual metafunction, and the work of repetition and intertextual referencing in particular, resulted in the examples detailed below, illuminating how children are making meaning in conversation with one another multimodally. Their creativity is expressed through their use of intertextual referencing and novel uses of modes. In the next section I offer specific examples taken from a science lesson which contribute to understandings of children's classroom communication specifically through the children's use of gesture and posture to convey meaning.

Evidence of meanings in between and around words, postures and gestures.

The episode presented here is from a science lesson on the circulation of the blood. I have selected this instantiation of classroom communication because of the particular use of multiple modes which demonstrated the children's knowledge though modes other than language. The affordances of the role play activity are such that close analysis of modes such as gesture and posture at work in meaning-making was possible. This episode took place during an afternoon lesson in a classroom equipped with an interactive whiteboard. The classroom was organised with five groups of desks accommodating 4 or 6 pupils and at the front a carpet area in front of the whiteboard with the teacher's

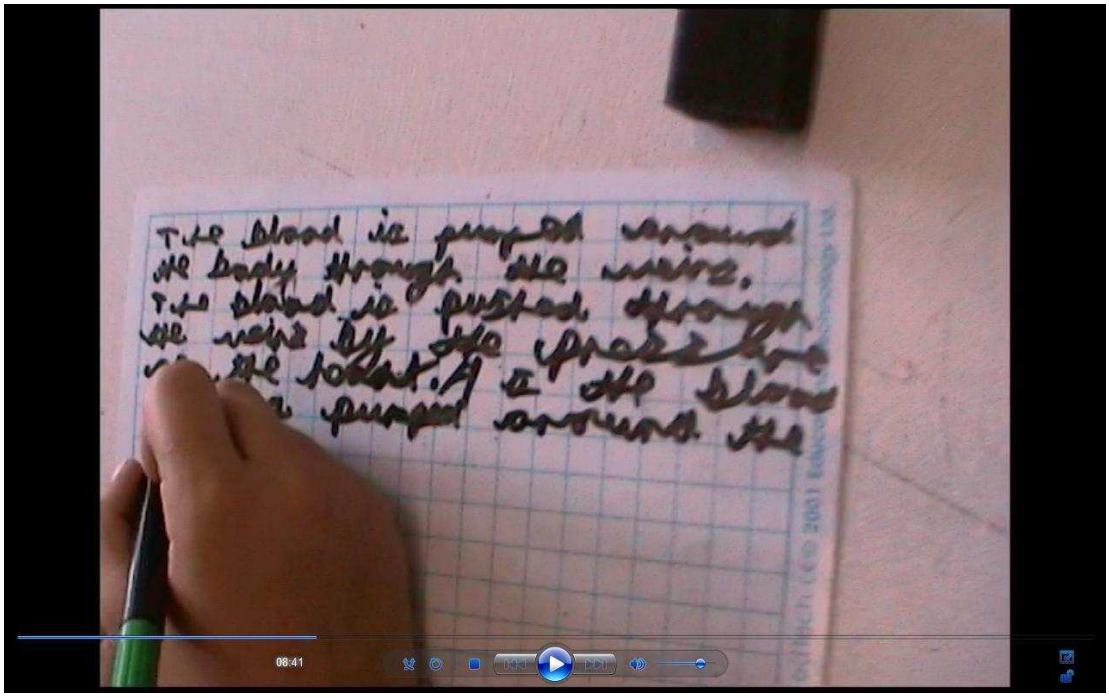
desk to the side. It began with the teacher using a carousel formation to mix up the children so that they were sitting next to a different partner from one they usually work with. On the board was written:

WALT: can understand that the heart pumps blood to all parts of the body.

Success Criteria: I can work with my class mates through movement to show how the heart pumps blood around the body. [1]

The children were asked to write down in pairs how they think blood pumps around the body. An example is shown in Figure. 1.

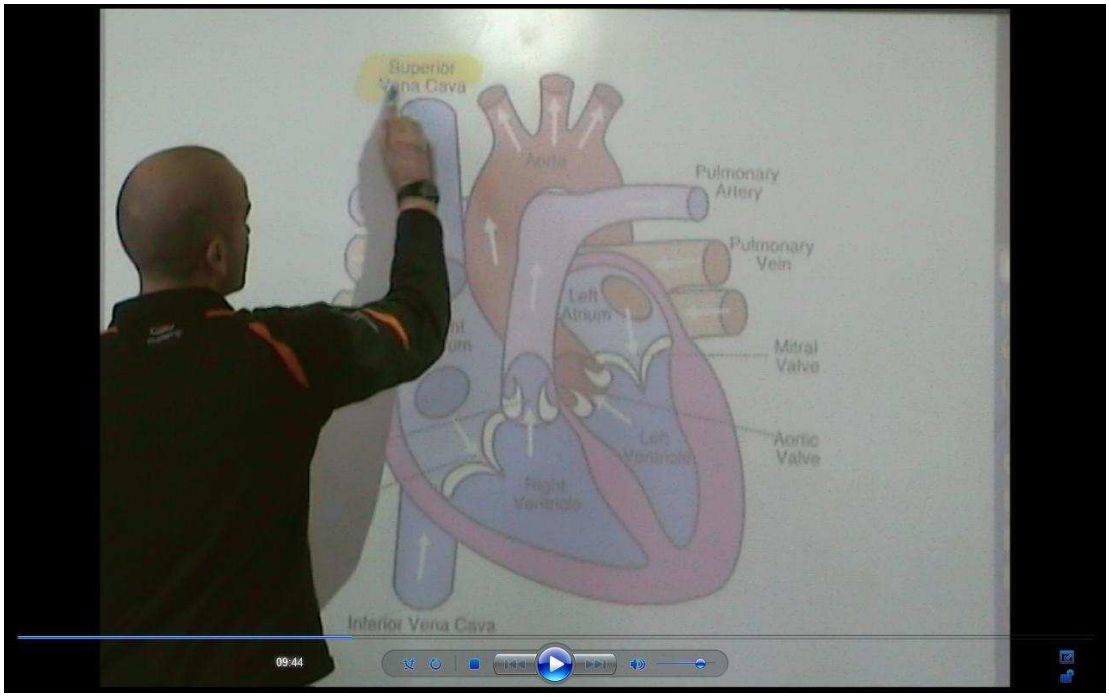
Figure 1. LK writing about the heart



The children then moved on to sitting on the carpet area in front of the whiteboard where the teacher talked them through a diagram of the heart on the interactive whiteboard. He explained that the diagram was from a medical website and that they didn't need to know all of the words.

Figure 2. Teacher explains heart diagram.

[1] It is common practice in UK classrooms for teachers to signal the objectives of the lesson by writing on the board WALT (We Are Learning Today) and Success Criteria.



One of the pupils, M, produced a book, The Human Body, from the library shelves in the corner of the room with a similar diagram and the teacher read out what it said about the heart. He asked the class, 'can you think of a bit of the body that doesn't need oxygen?. The children suggested 'hair', 'nails', 'teeth', 'ears' until J announced 'Everything needs oxygen'. D also supplied 'Blood cells carry oxygen.' The children watched an animated diagram (www.mayoclinic.com/health/circulatory_system/mm00636) on the interactive whiteboard and then the teacher talked through the diagram pointing to pertinent parts as he did so. They then watched another short animated diagram about cells (www.cellsalive.com/howbig) to gain a sense of the size of the blood cells. The children then returned to their tables to edit what they had already written on their whiteboards and add a bit more. JB waned to know if they could add 'pictures' which the teacher replied 'yes' to.

The class was then divided into two groups and I was invited to take a group of nine to an empty classroom upstairs to practise acting out the circulation of the blood around the body. The recording of interaction of seventeen minutes duration was roughly transcribed and three extracts of one minute, two minutes and two minutes were then multimodally transcribed and analysed. These specific extracts from the lesson were chosen because of the particular gestures and postures employed in the children's meaning-making and I wanted to examine what part these gestures and postures played in the communication and development of ideas and learning.

During this episode the ideational aspects to the interaction included the children's talk about who would 'be' each part of the process and they repeat a narrative telling what happens at each stage of the circulatory process 'in character' explaining who they are and what they're doing. They acted out each stage of the blood circulation with appropriate actions. They judged their own performances and they checked information with R (researcher). Mixed in with the task-focused interaction, there was a running joke with lots of word play around 'tissue': this was not one of the key words supplied by the teacher but one they had heard on the 'Cells Alive' animated diagram. There was some peripheral messing about – such as L's comment that 'the blood cells are fighting – lets join in', L looking at the computer in the corner of the room and there was brief mention of a television programme, The Bill. The children were assigning and taking on roles and (in some cases physically, in some cases verbally) positioning people in their roles as heart, lungs and blood cells. Halliday (1975) refers to this as the Regulatory interpersonal function. There were examples of the children displaying their knowledge of the heart and blood circulation, described by Halliday as the Heuristic function, and further examples of the Interactional function where the children were establishing and confirming friendship groups. The social bonding and close physical contact could be seen as a manifestation of the Interactional interpersonal function showing how attention to all modes through textual analysis can reveal the way in which all semiotic resources were being employed by the children.

Three examples are presented from the close textual analysis of extracts from this lesson through attention to the cohesive devices of repetition, reference, omission, substitution, conjunction and intertextual reference. The first two arise from attention to the use of repetition, and they include examples of word-play, and the social bonding realised through repeated words, haptics and posture. The third example is use of postural intertextuality revealed through multimodal textual analysis.

(1). Repetition and Word Play

The children's participation in meaning-making and their social bonding can be revealed through close analysis of the textual function in all modes. The first example centres on the repetition and word play around the word tissue/ tishoo(Table 3 a.b.c). As described above, at the beginning of the lesson, the children had seen an animated film of the blood circulation through the heart and lungs and around the body and understood the concept of 'tissue' as being 'cells' as they had also seen an animated diagram of this. However, they enjoyed O's double–entendre by putting the article 'a' in front of 'tissue' (table 3a , line 7) and thus changing it from an uncountable noun referring to a substance into a countable noun referring to a tissue for blowing one's nose: bodily functions being a staple of children's humour generally, this was setting up the joke from the start. K acted as a foil for O's next gag which was an extension on this by asking 'what's a tissue?' she returned O to his funny quip and he did not disappoint with 'Blow yer nose' itself an idiomatic expression and an example of

fixity. The novelty here came from its' deliberate out of place use in the genre of blood circulation. The subsequent repetition of the word 'tissue' by four girls was a confirmation of O's humorous contribution and their own gratification by linking the technical word with the onomatopoeic exclamation 'atishoo' for sneezing. This is an example of substantial interplay around the word 'tissue' and related concepts. The children were manipulating two speech genres here, the scientific, formal genre for describing the circulation of the blood and their own informal exchanges. Table 3a, b,and c are three extracts from the transcript showing the repetition of this word play throughout this episode.

Example Tissue Table 3a

Line	Speech/vocalisation	Actions	Gaze	Gesture, facial expression	Posture, proxemics, haptics
7	O you can be a tissue			O Points at K	
8	All children laugh				C moves toward K holding hands, BC comes to K's left shoulder

Table 3b

19	K what's a tissue	L, K, C BC advance on O			
20	L I don't know				
21	O blow yer nose				
22	All laugh	Girls retreat in to a circle, laughing.		Ol hand in mouth	

Table 3c

30	Ol, L, K, BC (all say word over and over) Tisshooos, Tish - ooooo				
31	L who wants to be a tissue with K****		O looking at K,	L fingers in mouth	

(2.) Repetition and haptics

Now I present the second example which illustrates the social bonding between the pupils. (See figures 3a and b) This is of an act of participation and bonding not realised linguistically, through the repetition of another's words, but haptically. Social bonding could be seen as an interpersonal feature of discourse, which it is, but the realisation through words or actions is also a textual cohesive device. If the mutual appreciation of each other's ideas is achieved through repetition of words, for example, then their approval of each other and therefore each other's ideas is also demonstrated through proxemics, haptics and actions. In this example, O's immediate response to L's claim to be part of the heart was to align himself with L by putting his arm around his shoulders. When O claimed the left side of the heart, L put up his right arm signalling he wished to be the right side. His words then confirmed O's role as left side of the heart and through his alliance his own role as the right side. The two boys cemented their union by bouncing lightly on the balls of their feet, arms around each other. The proximity of the boys' positions confirmed their close alignment in posture as well as through language.

(3.) Intertextual reference and posture

The third set of examples from the data that I present here is of **postural intertextuality** (Taylor, 2006) whereby the children take meaning from one mode and re-present that meaning through their own embodied modes. It is an example of intertextual reference, where an instantiation of meaning in one text is re-worked to give meaning in another text. This is often associated with linguistic intertextual reference but can be realised through music or visual images in a film text, for example. Here posture is used. In the examples in this article the children are taking images they have seen in animated diagrams on the interactive whiteboard of the blood circulation and embodying them in their own text. These are examples of factual information – the working of the heart and lungs, being re-presented using postural modes subsequent to the student viewing this information through visual and auditory

modes on the interactive whiteboard. In Kress's terms the prompts for the children's postural acts of meaning-making have occurred in prior, alternative texts and modes (Kress, 2010:33).

> At all times communication is a response to a 'prompt': a gaze might produce a spoken comment that leads to an action…that prompt has been interpreted becoming a new inward sign, and in turn leading potentially to further communicational action.
>
> Kress, 2010:32

This reference to prior texts is not referred to through language but is communicated solely through posture as the following examples show.

In the first example of postural intertextuality the movement of the heart valves as demonstrated on the diagram on the whiteboard was re-presented through a hand gesture accompanied by noise.I (Researcher R) asked the question 'What do the valves do?' and yet in the moment, in the classroom, I missed L's gesture and it was not until I reviewed the tape later that night that I saw the clear representation of the movement of the heart valves that L had seen on the animated diagram of the heart.

1

Figure 3 a)

2

Figure 3 (b)

In Figure 3a, L can be seen moving his hands together to make the valves of the heart. In Figures 3b and 3c the valves open and in Figure 3d they return to the closed position. L mirrored the images he had seen on the animated diagram on the interactive whiteboard earlier. The movement of the valves on the diagram had a pulsating rhythm which L replicated, although that is not possible to show in a photographic still. He appeared to press his lips together firmly and as he opened the valves he opened his mouth. He appeared to say 'boom' or 'move' (it is indistinct) either as an accompanying sound or in answer to the question – they move. This example is L's spontaneous recreation of the movement

of the heart valves, a carefully reconstructed representation of the animation seen on the interactive whiteboard. His use of his hands to represent the movement of the heart valves is repeated by L and then by J during the interaction which shows an understanding of what has been communicated through gesture between the two boys. It was not until I reviewed the film data that the significance of these movements in terms of the knowledge and understanding being shared by these pupils through the modes of gesture became apparent.

3

4

Figure 3(c) (d) – The Heart Valves

A second example from this lesson of knowledge being presented through posture is B's re-presentation of the movement of the lungs as they expand on taking in air, (see Table 4 Lungs) .B's action in response to my question, to a group of three girls O, L and B (line 7 'what are you going to do, lungs?' was to breathe in exaggeratedly deeply. B answers my question with an action. When I persisted with 'what do you say? 'O replied 'I give the blood cell oxygen' and pats L, the blood cell, on the hand. B's reply demonstrated that she knew what lungs do. The workings of the lungs were therefore re-presented through embodied modes through the action of deeply breathing in as the actions of the heart valves were similarly re-presented through gesture. B demonstrated her knowledge of the function of the lungs through bodily action rather than words (line 9). There is an absence of language but not an absence of meaning. As she performed this enactment she averted her gaze and partially closed her eyes (see Figure 4 Lungs). She was utterly absorbed for one brief

moment in performing the action of the lungs in taking in air. This was demonstrated for my benefit and in answer to my question.

Table 4 Lungs

Line	Speech/vocalisation	Actions	Gaze	Gesture, facial expression	Posture, proxemics, haptics
7	R what are you going to do, lungs?				
8	Ol and B laugh		Ol and B look at each other		B leans in to Ol, then looks away
9		B breathes in exaggeratedly deeply.			

Figure 4Lungs: B acts the function of the lungs

In the science lesson presented here the children were shown diagrams or animations from the interactive white board. Images from these semiotic resources were then re-presented by the children through embodied modes of gesture, posture, facial expression and bodily action. The workings of the lungs were re-presented through embodied modes through the action of deeply breathing in and the actions of the heart valves were similarly re-presented through gesture. I have chosen two examples of knowledge being conveyed through modes other than spoken language which were not immediately apparent at the time but were revealed through close analysis of the video recording. I had not noticed these two clear instances of understanding and knowledge contemporaneously. In these examples the affordances of the 'space' within which the children were interacting, that is the fact that the children were working in an empty classroom with plenty of room to move about, and on a task which required them to role-play a science concept, needs to be borne in mind. In these examples, information from class-based digital texts were being re-presented using embodied modes other than speech, suggesting a physical understanding of the knowledge presented. The opportunity presented by space to physically move about has been taken up by the children in these examples.

Discussion

This research was built upon the premise that we construct knowledge through a process of learning and that process of learning is partly accomplished, from a social constructivist perspective, in interaction and collaboration with others. That is, through sharing ideas about our understanding of the world and responding to and building on others' ideas we reach a deeper level of understanding and develop our knowledge of a skill or aspect to life on earth. The children were learning through social activity and demonstrated knowledge in a variety of ways. The most significant point here is that they shared ideas through multiple modes and that their learning took place through multiple modes.

It is important to emphasize that modes other than language are not simply additional contextual information, but part of an enmeshed nexus of many modes used in conjunction with one another for the purpose of making meaning. All modes are potentially available for making meaning, within the constraints of our social world. The mode selected by the communicator is the one judged by them to be the most apt and expedient at that moment in time. At the same time other meanings are simultaneously being realised around the communicator which are part of the meaning-making but beyond their control. In educational settings, these could be the wider institutional discourses and ways of communicating, such as the confines of a syllabus, the arrangement of classroom furniture or for example, a bell signalling the end of lessons as a pupil speaks. Our social lives, the histories of our social practices and our social interaction are inextricably intertwined (Jewitt, 2009; Coupland, 2007). Coupland (2007:86) uses the metaphor of freedom to select clothes to wear from a closet to explain

the way in which our words, and in fact our wider multimodal meaning-making, are to some extent predetermined by social and cultural contexts. This view of pre-conditioning, which limits a 'real' choice about how we communicate, and the effects of our social world in shaping our choices in meaning-making, can be applied to all modes and not restricted to language. Modes other than speech are not 'extra linguistic contextual factors' but all modes are part of the communicative process resonnating with Goodwin's dismissive view of 'lumping everything together that isn't language into the category 'context' (Goodwin, 2000) as being inadequate. The education researcher therefore needs to be sensitive to the selection of modes made by the pupils in this instance and to the affordances of modalities available in any given circumstances.

The illustrative examples presented here, relating to children's multimodal meaning-making in classrooms, demonstrate how that the work of re-presenting information from a text can be conducted using alternative modes of meaning-making and that intertextual referencing, noted in children's use of language by Maybin (2004:102) can be realised through posture and gesture**.**.This key finding represents an original contribution to knowledge in that the intertextual referencing which Maybin (2004) has described as integral to children's talk, through the use of multimodal analysis can be seen to be present in children's use of all embodied modes and not solely speech. Maybin describes the use of intertextual references as being automatic, unconscious and strategic (2004:102) and the analytic framework has allowed for the ways in which children are spontaneously using posture and gesture intertextually to be seen. The specific postural intertextual references noticed in this data are the heart valves gesture mirroring the digital image viewed in class, and the re-presentation of the function of the lungs using posture.

This analysis contributes to our understandings of the use of gesture and posture from the fields of anthropology and social semiotics, and requires us to consider their role in interactions diachronically and not simply synchronically; that is, in relation to previous instantiations of meaning-making in any chosen mode. Following Bakhtin's idea that 'Each word tastes of the context and contexts in which it has lived its socially charged life' (Bakhtin, 1988: 49) we can see that this can apply to all modes of meaning-making and that gestures and postures can refer to previous instantiations of meaning-making in the same or a different mode. The use of gestures and postures is spontaneous and intertextual but it is not random or incoherent: its coherence arises from its recognisability and the meeting of expectations of the interactant. Prior instances of meaning-making help shape the posture or gesture in question. In the case of these examples of postural intertextuality, the functions of the posture or gesture are to convey meaning through a choice of an embodied mode. In each example the meaning made in a prior text or texts is re-created posturally with recognisable (in this case, visual) attributes from the prior text recognisable in the intertextual reference. In common with the use of other semiotic modes, the choice and design of the posture or gesture as a meaningful sign is a combination of prior instantiations and the making anew of a sign. The posture recreating the function

of the lungs in answer to my question communicates that idea through the use of an apt sign and an available resource at that moment in time (Figure 4).

Implications for Pedagogy

This article describes the classroom communication of Year 5 pupils as they work together and build upon each others ideas. It has examined closely pupil-to-pupil 'talk' in naturalistic settings and has examined the ways pupils communicate with each other in class. Its interest lies in all semiotic modes employed by the pupils with a recognition that whilst language, spoken or written, may be dominant at times, at others it will not be dominant and may be altogether absent. The National Curriculum is being redesigned for post-2014 and the consultation documents give a picture of the role of speaking identified therein (www.gov.uk/government/consultations, 2013). Talk in this proposed new national Curriculum at Key Stage 2 is viewed as having specific roles such as checking, questioning, inferring, predicting, summarising, identifying, evaluating, explaining. The emphasis is on the 'competence' of the speaker (p13) and the acquisition of vocabulary, grammar and linguistic conventions for reading, writing and spoken language. There is an emphasis on teaching pupils to use conventions for discussion and debate. Furthermore teachers are expected to give feedback and guidance on the quality of their explanations and contributions to discussions (p14). In other words there is the notion of language as having measurable levels of competence. This is a perspective on talk which does not have a place for the exploratory talk, or draft talk that Barnes refers to (1976) as being so essential in the collaborative co-construction of knowledge, nor of the informal, spontaneous talk which Carter identifies as the most creative (Carter, 2004:165). This study suggests that if we truly want creative generation of ideas and collaborative construction of knowledge in our classrooms then we not only need to offer the physical and mental spaces for this to happen, but we also need to take account of the work of modes other than language. This has implications in terms of planning; that is, in terms of the spaces and opportunities that are provided in the classroom for pupils to fully explore, experiment with and collaborate on new themes and concepts using all modes available. It requires the teacher to recognise and value multimodal contributions as part of the process of creating a text where the final product may be the result of one or two dominant modes, such as a written explanation or pictorial illustration.

The dominance of linguistic modes in the consultation documentation for the 2014 curriculum is clear from the outset. The implications of this research are that language does not always operate as the dominant mode in spontaneous interaction. Generic features of discourse can be presented through all

modes of meaning-making. Moreover, given the space and opportunity much collaborative, creative text making is achieved through a variety of multiple modes. The product may be realised through one or more dominant modes such as a stretch of writing but the process, the journey which is taken to realise that product, requires multiple modes used in an integrated and coordinated way (Sidnell, 2006). In order for teachers or educationalists to recognise and value this semiotic work they need first to be aware of its instantiations. It is hoped that the illustrative examples presented from this study will go some way to raise awareness of just how children communicate and learn through all available semiotic resources.

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